DRAINAGE ANALYSIS

for

TABLE MOUNTAIN GOLF COURSE

2700 Oro Dam Boulevard
Oroville, California 95965

Prepared by:
BBA Engineering
2060 Park Avenue
Oroville, California 95966
(530) 534-1911

April 30, 1998

TABLE OF CONTENTS

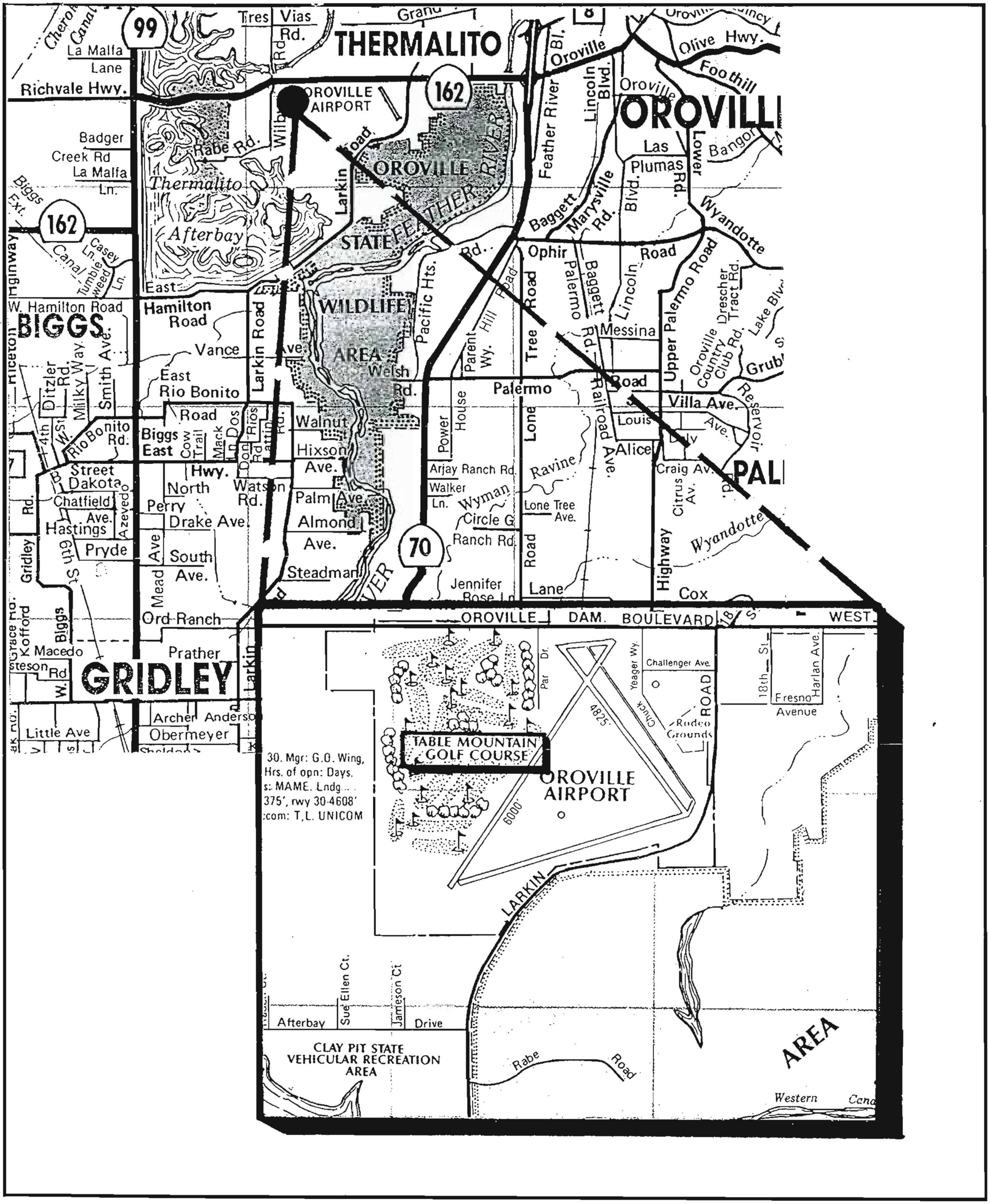
LIST OF TABLES AND FIGURES

General Information

Table Mountain Golf Course is an 18-hole course and is divided into two major sections referred to as the *"Front Nine"* and the *"Back Nine".* Each area consists of approximately 100 acres each, with a variety of structures on-site including a club house, paved parking area, overflow parking area, maintenance building, golf cart storage building and maintenance yard. The philosophy of the Board of Directors has been to upgrade and improve the course facilities, when financially feasible, to provide enjoyable play year round.

The golf course is located on lands owned by the City of Oroville, leased to Table Mountain Golf Course, a non-profit entity, for a long term. The lands are managed and improved by operating funds from the activities of the golf course. The golf course is bounded on the north by State Highway 162, on the east, by the Oroville Airport, to the south by fallow lands also containing constructed vernal pools and wetlands, and to the west, undeveloped fallow lands (Figure 1). The site is located in portions of Sections 15 and 22, Township 19 North, Range 3 East, Mount Diablo Base and Meridian, also identified by Assessor's Book 30, at Page 26, Parcels 35 and 46, containing approximately 205 Acres (Figure 2).

The site is characteristic of the surrounding area consisting of very little relief. The course is relatively flat, with approximately five to twenty feet of vertical elevation difference between the north and south areas, and from the northeast to the southeast areas.. There is approximately five feet of vertical elevation difference from the northwest to southeast and west to east areas of the subject property. Any relief or



VICINITY MAP

TABLE MOUNTAIN GOLF COURSE
2700 ORO DAM BLVD.
OROVILLE, CA 95965

FIGURE 1
DRAINAGE ANALYSIS
APRIL, 1998

terrain found on-site is characteristic of man made features specifically for the enhancement and development of the fairway configuration and design elements.

Vegetation is consistent and characteristic of imported, non-native trees, shrubs, and ground covers. Turf utilized on the site for tees, fairways, rough, and greens are typical for this area, consisting of annual ryes, fescues, bluegrass, and bermuda. There is some evidence the turf is struggling in some areas due to drainage and irrigation problems.

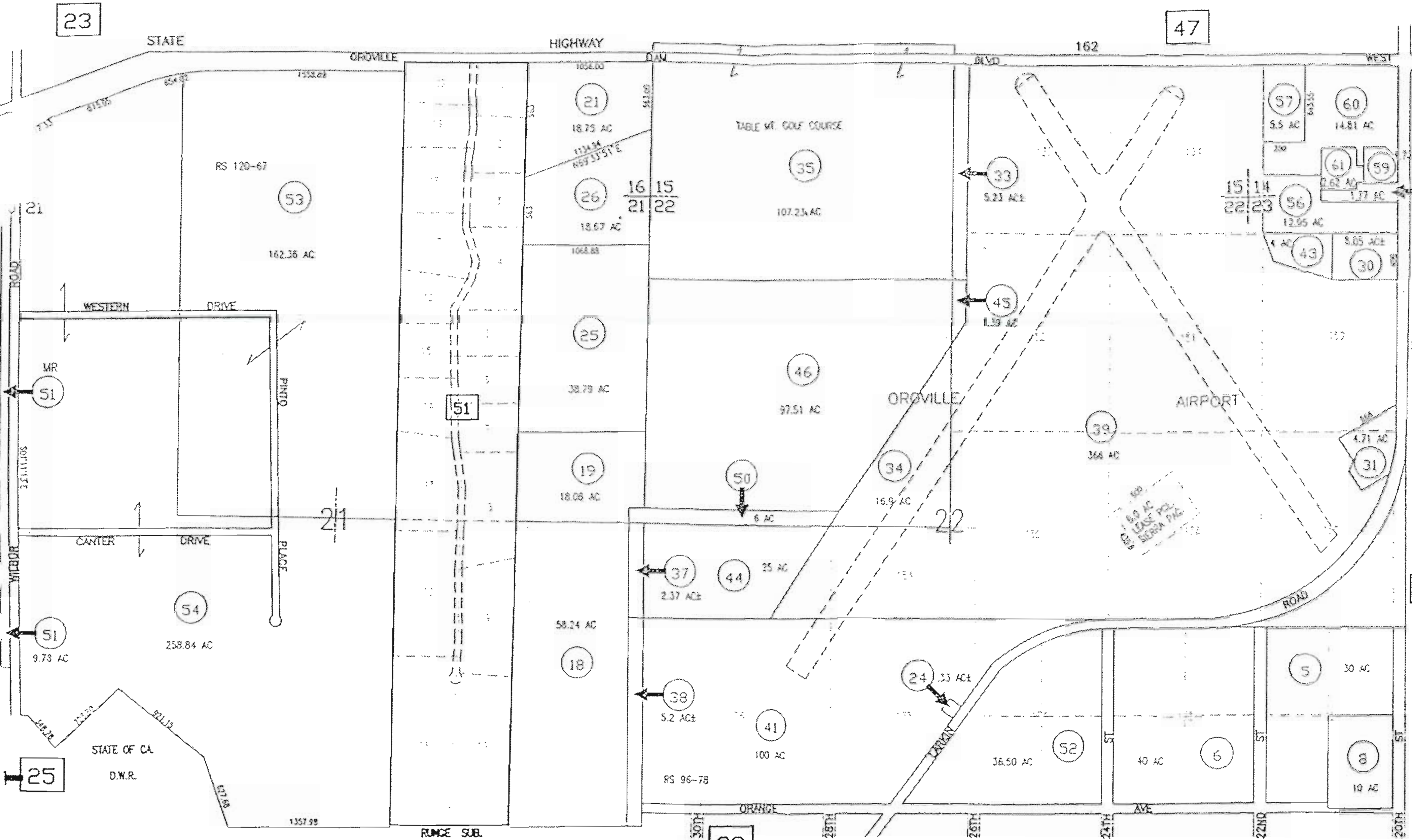
The geology of the site and surrounding area consists of igneous and meta-igneous rocks, formed between the Pliocene and Pleistocene periods during the Cenozoic era. The deposits are predominantly non-marine sedimentary deposits equivalent to the Laguna Formation and Arroyo Seco Gravel found to the south consisting of silt, sand, clay and unsorted gravel.[1]

Soils surveyed on the site consist of two types; 1) Rocklin Fine Sandy Loam, to the west, 2) Redding Gravelly Sandy Loam, to the east.

Rocklin series soils are composed of two layers; the upper 2" consist of pale brownish-red material which has a fine granular or imperfectly developed platy structure. The subsurface layer is composed of granular structure. The upper part of the subsoil, or zone of accumulation, consist of imperfectly developed prismatic structure which breaks down to small clods. The lower subsoil consists of red clay, stiff and plastic when wet, but dries out to a columnar or prismatic structure. The lower

[1] Geologic Map of California, Chico Sheet, Division of Mines and Geology, 1962.

T.19N R.3E. M.D.B.&M. 30-26



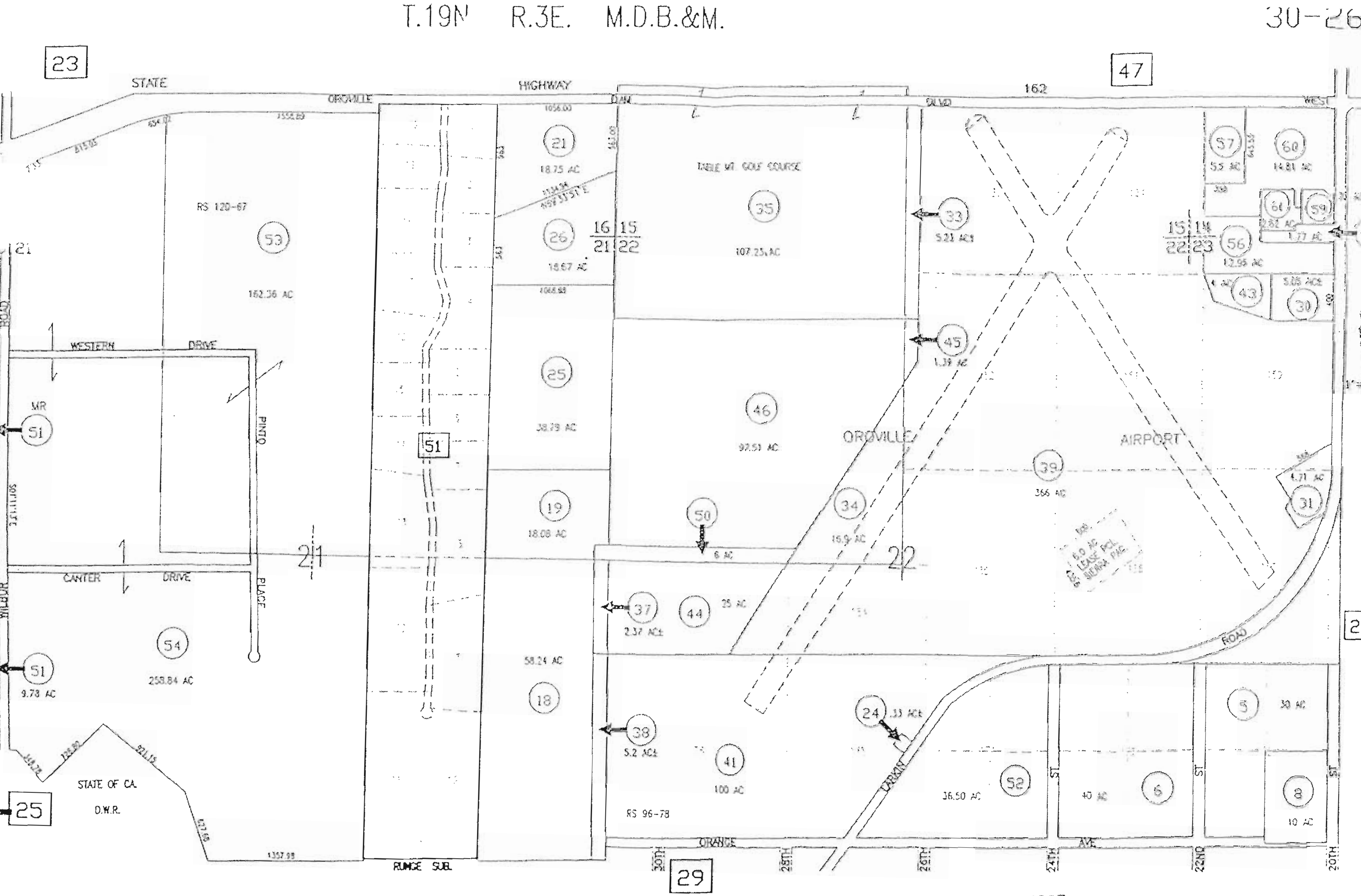
JUN 1997

REVISED: 5-97

Assessor's Map No. 30-26
County of Butte, Calif.

TABLE MOUNTAIN GOLF COURSE
2700 ORO DAM BLVD.
OROVILLE, CA 95965

FIGURE 2
DRAINAGE ANALYSIS
APRIL, 1998



JUN 1997

REVISED: 5-97

Assessor's Map No. 30-26
County of Butte, Calif.

TABLE MOUNTAIN GOLF COURSE
2700 ORO DAM BLVD.
OROVILLE, CA 95965

FIGURE 2
DRAINAGE ANALYSIS
APRIL, 1998

subsoil reaches to an approximate depth of 26 inches, into a layer of indurated hardpan which varies in thickness from 1-10 inches. Below the hardpan, lies a cemented or semi-consolidated, impervious substratum of fine textured sediments which are unrelated to the materials above.

Redding soils have a brownish-red, dull-red, red, or yellowish red surface soil underlain by an upper subsoil layer of slightly compact and heavier textured material which grades into a very compact and much heavier lower subsoil layer having jointed or prismatic structure. Below the lower subsoil lies hardpan which is underlain by a permeable mass of gravel and cobbles.[2]

Average precipitation for the area ranges from 20-25 inches per year. The golf course exhibits partial flooding and standing water during periods of rainfall due to the soil types described above as well as the problems found within the existing drainage patterns (Figure 3). During periods of extended rainfall combined with high precipitation, the storm drainage system backs up from the outfall at the southeast corner of the property and inundates the *"Back Nine"* to a level unplayable subsequent to the subsidence of wet weather.

[2] Soil Survey of the Oroville Area, California, US Dept. of Agriculture, Series 1926.

Drainage Analysis

The existing storm water drainage system for Table Mountain Golf Course consists of a series of open channel and closed conduit systems. The closed conduit system typically carries the storm water under cart paths or other obstructions to an open channel system. The majority of the drainage system provides for open channel transport of on-site and off-site surface drainage. Several factors contribute to the drainage problems found at the golf course. These include:

1) Off-site storm water flows of approximately 42 cfs contribute more than 50% of the water discharged downstream;
2) Existing conduits are undersized and/or in poor condition incapable of transporting the required flows;
3) The outfall at the southeast corner of the course is lower than the outfall at the Airport by 1.24 feet. This creates a condition of negative flow, backing up the system onto the course, instead of transporting the storm water downstream to the point of discharge;
4) Soils substratum consists of unrelated cementitious materials which prevent percolation of storm water;
5) Inadequate positive flow from each of the fairways out to a point of discharge creates ponding throughout the site;
6) Inadequate placement of storm water detention facilities to reduce backflow throughout the site; and,
7) Open channel flow restrictions due to growth of vegetation.

Drainage Analysis

The site plan, "*Existing Drainage Patterns*", Figure 3, delineates the direction of flow throughout the site by use of arrows. Typically, the fairways drain from the top of each fairway to each side. Ponding occurs along the sides of the fairways where the slope of the drainage is inadequate to carry the discharge into culverts or open channels.

The north side of the golf course transports roadside drainage along Highway 162 in a westerly direction. There is one high point at the easterly side where drainage flows in an easterly direction, which changes direction moving south along the entry drive, also crossing Wes Barrett Drive. As shown on the plan, there are four(4) culverts which cross Highway 162. These culverts seem adequate for the flows from the roadway. There does not appear to be off-site storm water from the north impacting the golf course. During periods of heavy precipitation, there is some evidence of ponding (Pond P_b) on the northwest corner of the course, however, it does not appear to impact the fairways.

Lands lying to the west of the golf course exhibit areas of ponding and probable discharge to the south. Much of the area contains low lying areas which trap storm water and retain it until it may evaporate and/or spill out to a southerly direction.

Off-site storm water discharged into the golf course drainage system originate from a portion of the north side of Highway 162, as described above, and the Oroville Airport. This storm water collects at the northwest corner of the Airport, is transported south in an open channel and crosses Wes Barrett Drive, entering the golf course by

2-24" reinforced concrete pipes. The off-site storm water then flows through the site, crosses Fairway 9 through an existing 30" corrugated metal pipe, crosses under the cart path, is transported through an open channel crossing the Driving Range, and then crosses Fairways 1 and 10, where it reaches Pond P_h. As the drainage system backs up from the outfall at Fairway 18, storm water is pushed up through the system through Pond P_m, back through the existing 24" corrugated metal pipe, thus forcing flows to a westerly direction flooding Fairways 16, 11, 10, and 2. Storm water backflow is also caused by the inadequate sizing of the 24" corrugated metal pipes existing through 11, 15, 17, and 18. The flow characteristics of these culverts is inadequate to handle the flows required.

The golf course has been divided into four main tributary areas which control the sizing of the proposed storm retention ponds (Figure 4). Included within area P3, is the off site storm water generated from the Airport as described above. Table 1 below identifies the quantities used in the rational method.

Table 1: Tributary Flows for Pond Sizing

Description	Area(Acres)	Coef	AC	Ti (Min)	In/Hr(Intensity)	CFS(Flow)
P1-Pond 1	29.26	3.5	10.2410	39	1.2	12.2892
P2-Pond 2	31.83	0.35	11.1405	39	1.2	13.3686
P3-Pond 3	90.31	0.46	41.6974	57	0.91	37.9446
-Pond 3	53.25	0.35	18.6786	39	1.2	22.4143
P4-Pond 4	40.69	0.39	15.7655	39	1.2	18.9186

Tables 2-4 on the following pages reflect the size of the pond for each area delineated in Figure 3 for use in storm detention. The pond sizes may utilize only one pond or be

Table 2: Pond 1 Storage Design

SUM CA	10.24		
S. SLOPE=	1 :1		
POND DIMENSIONS:			
WIDTH =	**212**	**FEET**	
DEPTH =	**1.00**	**FEET**	
LENGTH =	**212**	**FEET**	
TOTAL STORAGE PROVIDED =	44521 CF		
TOTAL STORAGE REQUIRED(10) =	20550 CF		
TOTAL STORAGE REQUIRED(100) =	33121 CF		

PERC.RATE	1000000	MIN/IN
NO. OF PONDS =	1	
POND VOLUME =	44521.0	CF
POND PERC AREA =	23071.6	SF
TOTAL PERC RATE =	0.0000	CFS
Qout(10)max =	3.72	CFS
Qout(100)max =	4.56	CFS

STORM DURATION			I(10)	I(100)	Qin(10)	Qin(100)	Qout(10)	Qout(100)	Qnet(10)	Qnet(100)	h (ft)		REQUIRED STOR. VOL (cu. ft.)	
(Hr.)	(Min)	(Sec)	(IN/HR)	(IN/HR)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	10 yr.	100 yr.	10 yr.	100 yr.
0.08	5	300	3.59	5.06	36.77	51.79	0.00	0.00	36.77	51.79	0.25	0.35	11032	15538
0.17	10	600	2.45	3.46	25.13	35.41	2.93	3.33	22.20	32.08	0.30	0.43	13323	19248
0.20	12	720	2.22	3.13	22.74	32.03	3.14	3.62	19.60	28.41	0.31	0.46	14113	20458
0.25	15	900	1.96	2.77	20.11	28.34	3.20	3.71	16.91	24.63	0.34	0.49	15219	22168
0.33	20	1200	1.68	2.36	17.18	24.20	3.30	3.84	13.88	20.37	0.37	0.54	16652	24440
0.42	25	1500	1.48	2.09	15.19	21.41	3.42	4.00	11.78	17.42	0.39	0.58	17667	26125
0.50	30	1800	1.34	1.89	13.75	19.37	3.50	4.11	10.25	15.26	0.41	0.61	18448	27474
0.58	35	2100	1.23	1.74	12.63	17.80	3.56	4.20	9.07	13.60	0.42	0.64	19051	28565
0.67	40	2400	1.15	1.62	11.74	16.54	3.60	4.27	8.13	12.27	0.43	0.66	19518	29456
0.75	45	2700	1.07	1.51	11.00	15.51	3.64	4.33	7.36	11.18	0.44	0.67	19877	30187
0.83	50	3000	1.01	1.43	10.38	14.64	3.67	4.38	6.72	10.26	0.45	0.69	20148	30788
0.92	55	3300	0.96	1.36	9.85	13.89	3.69	4.41	6.17	9.48	0.45	0.70	20348	31281
1.00	60	3600	0.92	1.29	9.39	13.24	3.70	4.44	5.69	8.80	0.46	0.70	20489	31682
1.50	90	5400	0.73	1.04	7.52	10.60	3.71	4.47	3.81	6.13	0.46	0.74	20550	33121
2.00	120	7200	0.63	0.88	6.42	9.05	3.72	4.56	2.70	4.50	0.43	0.72	19456	32379
2.50	150	9000	0.55	0.78	5.68	8.01	3.64	4.51	2.04	3.50	0.41	0.70	18395	31489
3.00	180	10800	0.50	0.71	5.14	7.25	3.55	4.46	1.58	2.79	0.38	0.67	17109	30141
4.00	240	14400	0.43	0.60	4.39	6.19	3.45	4.37	0.93	1.82	0.30	0.58	13456	26160
5.00	300	18000	0.38	0.53	3.88	5.48	3.15	4.11	0.73	1.36	0.29	0.55	13209	24521
6.00	360	21600	0.34	0.48	3.51	4.95	3.13	4.00	0.39	0.95	0.19	0.46	8332	20571
8.00	480	28800	0.29	0.41	3.00	4.23	2.66	3.72	0.34	0.51	0.22	0.33	9725	14722

Table 3: Pond 2 Storage Design

SUM CA 11.14
S. SLOPE= 1.5 :1
POND DIMENSIONS:
WIDTH = 150 FEET
DEPTH = 2.00 FEET
LENGTH = 800 FEET

TOTAL STORAGE PROVIDED = 234318 CF
TOTAL STORAGE REQUIRED(10) = 65878 CF
TOTAL STORAGE REQUIRED(100) = 100512 CF

PERC.RATE 100000000 MIN/IN
NO. OF PONDS = 1

POND VOLUME = 234318 CF
POND PERC AREA = 63425.3 SF
TOTAL PERC RATE = 0.0000 CFS
Qout(10)max = 3.95 CFS
Qout(100)max = 4.74 CFS

STORM DURATION			I(10)	I(100)	Qin(10)	Qin(100)	Qout(10)	Qout(100)	Qnet(10)	Qnet(100)	h (ft)		REQUIRED STOR. VOL (cu. ft.)	
(Hr.)	(Min)	(Sec)	(IN/HR)	(IN/HR)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	10 yr.	100 yr.	10 yr.	100 yr.
0.08	5	300	3.59	5.06	40.01	56.35	0.00	0.00	40.01	56.35	0.10	0.14	12002	16904
0.17	10	600	2.45	3.46	30.27	41.85	2.23	2.44	28.04	39.40	0.14	0.20	16826	23642
0.20	12	720	2.22	3.13	27.88	38.47	2.44	2.71	25.43	35.76	0.15	0.21	18313	25744
0.25	15	900	1.96	2.77	25.08	34.54	2.50	2.79	22.58	31.75	0.17	0.24	20322	28575
0.33	20	1200	1.68	2.36	21.98	30.17	2.58	2.90	19.40	27.27	0.19	0.27	23280	32729
0.42	25	1500	1.48	2.09	19.95	27.30	2.70	3.04	17.25	24.25	0.22	0.30	25874	36382
0.50	30	1800	1.34	1.89	18.45	25.19	2.80	3.16	15.66	22.02	0.23	0.33	28182	39644
0.58	35	2100	1.23	1.74	17.30	23.57	2.88	3.27	14.42	20.30	0.25	0.36	30279	42630
0.67	40	2400	1.15	1.62	16.37	22.27	2.96	3.36	13.41	18.91	0.27	0.38	32191	45380
0.75	45	2700	1.07	1.51	15.61	21.20	3.02	3.44	12.59	17.76	0.28	0.40	33985	47947
0.83	50	3000	1.01	1.43	14.97	20.30	3.08	3.52	11.88	16.78	0.30	0.42	35650	50352
0.92	55	3300	0.96	1.36	14.41	19.52	3.14	3.59	11.27	15.93	0.31	0.44	37197	5257[illegible]
1.00	60	3600	0.92	1.29	13.92	18.85	3.19	3.65	10.73	15.19	0.32	0.46	38632	547[illegible]
1.50	90	5400	0.73	1.04	11.89	16.00	3.24	3.71	8.65	12.29	0.39	0.55	46735	66369
2.00	120	7200	0.63	0.88	10.70	14.41	3.48	4.02	7.22	10.38	0.43	0.62	51983	74767
2.50	150	9000	0.55	0.78	9.82	13.22	3.64	4.24	6.18	8.99	0.46	0.67	55638	80900
3.00	180	10800	0.50	0.71	9.14	12.34	3.74	4.38	5.40	7.96	0.49	0.72	58329	85991
4.00	240	14400	0.43	0.60	8.22	11.10	3.81	4.50	4.41	6.60	0.53	0.79	63507	95071
5.00	300	18000	0.38	0.53	7.37	10.07	3.95	4.70	3.42	5.36	0.51	0.80	61593	96520
6.00	360	21600	0.34	0.48	6.95	9.39	3.90	4.74	3.05	4.65	0.55	0.84	65878	100512

Table 4: Pond 3 Storage Design

SUM CA 60.4
S. SLOPE= 1.5 :1
POND DIMENSIONS:
WIDTH = 150 FEET
DEPTH = 4.00 FEET
LENGTH = 600 FEET

TOTAL STORAGE PROVIDED = 342144 CF
TOTAL STORAGE REQUIRED(10) = 194566 CF
TOTAL STORAGE REQUIRED(100) = 302149 CF

PERC.RATE 100000000 MIN/IN
NO. OF PONDS = 1

POND VOLUME = 342144 CF
POND PERC AREA = 50408.3 SF
TOTAL PERC RATE = 0.0000 CFS
Q(10)max = 15.89 CFS
Q(100)max = 20.87 CFS

STORM DURATION			I(10)	I(100)	Qin(10)	Qin(100)	Qout(10)	Qout(100)	Qnet(10)	Qnet(100)	h (ft)		REQUIRED STOR. VOL (cu. ft.)	
(Hr.)	(Min)	(Sec)	(IN/HR)	(IN/HR)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	10 yr.	100 yr.	10 yr.	100 yr.
0.08	5	300	3.59	5.06	216.91	305.50	0.00	0.00	216.91	305.50	0.72	1.02	65074	91650
0.17	10	600	2.45	3.46	151.17	212.17	8.48	10.44	142.69	201.72	0.95	1.34	85611	121034
0.20	12	720	2.22	3.13	137.25	192.57	10.03	12.25	127.22	180.32	1.02	1.44	91601	129832
0.25	15	900	1.96	2.77	121.85	170.88	10.44	12.74	111.41	158.14	1.11	1.58	100266	142329
0.33	20	1200	1.68	2.36	104.61	146.60	11.00	13.41	93.60	133.19	1.25	1.78	112324	159829
0.42	25	1500	1.48	2.09	93.04	130.30	11.74	14.29	81.30	116.01	1.35	1.93	121949	174022
0.50	30	1800	1.34	1.89	84.58	118.39	12.30	14.97	72.28	103.42	1.45	2.07	130106	186159
0.58	35	2100	1.23	1.74	78.06	109.21	12.76	15.52	65.31	93.69	1.52	2.19	137141	196741
0.67	40	2400	1.15	1.62	72.83	101.86	13.13	15.99	59.70	85.87	1.59	2.29	143275	206083
0.75	45	2700	1.07	1.51	68.54	95.81	13.46	16.39	55.08	79.42	1.65	2.38	148715	214426
0.83	50	3000	1.01	1.43	64.92	90.72	13.74	16.74	51.18	73.98	1.71	2.47	153546	221928
0.92	55	3300	0.96	1.36	61.81	86.35	13.98	17.05	47.84	69.30	1.75	2.54	157856	228678
1.00	60	3600	0.92	1.29	59.11	82.56	14.19	17.33	44.92	65.23	1.80	2.61	161710	234834
1.50	90	5400	0.73	1.04	48.06	67.00	14.38	17.57	33.68	49.43	2.02	2.97	181869	2669.
2.00	120	7200	0.63	0.88	41.59	57.96	15.33	18.80	26.26	39.16	2.10	3.13	189080	281929
2.50	150	9000	0.55	0.78	37.14	51.76	15.65	19.35	21.49	32.40	2.15	3.24	193398	291629
3.00	180	10800	0.50	0.71	33.86	47.21	15.84	19.70	18.02	27.51	2.16	3.30	194566	297088
4.00	240	14400	0.43	0.60	29.33	40.87	15.89	19.89	13.43	20.98	2.15	3.36	193457	302149
5.00	300	18000	0.38	0.53	26.04	36.41	15.85	20.07	10.20	16.34	2.04	3.27	183571	294090
6.00	360	21600	0.34	0.48	23.84	33.22	15.40	19.79	8.44	13.44	2.03	3.22	182269	290203
12.00	720	43200	0.23	0.33	16.82	23.70	15.35	19.65	1.47	4.05	0.71	1.94	63493	174820

Table 5: Pond 4 Storage Design

SUM CA	15.87		PERC.RATE	100000000 MIN/IN
S. SLOPE=	1 :1		NO. OF PONDS =	1
POND DIMENSIONS:				
WIDTH =	**175 FEET**		POND VOLUME =	116964.0 CF
DEPTH =	**4.00 FEET**		POND PERC AREA =	17292.4 SF
LENGTH =	**175 FEET**		TOTAL PERC RATE =	0.0000 CFS
			Q(10)max =	20.40 CFS
TOTAL STORAGE PROVIDED =		116964 CF POND	Q(100)max =	25.40 CFS
TOTAL STORAGE REQUIRED(10) =		44378 CF		
TOTAL STORAGE REQUIRED(100) =		62034 CF		

STORM DURATION			I(10)	I(100)	Q(10)in	Q(100)in	Qout(10)	Qout(100)	Qnet(10)	Qnet(100)	h (ft)		REQUIRED STOR. VOL (cu. ft.)	
(Hr.)	(Min)	(Sec)	(IN/HR)	(IN/HR)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	10 yr.	100 yr.	10 yr.	100 yr.
0.08	5	300	3.59	5.06	56.99	80.27	0.00	0.00	56.99	80.27	0.56	0.79	17098	24081
0.17	10	600	2.45	3.46	47.43	65.31	7.93	12.38	39.50	52.93	0.77	1.04	23702	31757
0.20	12	720	2.22	3.13	45.27	61.90	12.18	15.90	33.09	46.00	0.78	1.08	23822	33118
0.25	15	900	1.96	2.77	41.61	56.66	12.25	16.44	29.37	40.22	0.86	1.18	26431	36198
0.33	20	1200	1.68	2.36	37.62	50.92	13.56	17.62	24.06	33.30	0.94	1.30	28874	39963
0.42	25	1500	1.48	2.09	35.29	47.48	14.68	18.95	20.61	28.52	1.01	1.40	30915	42787
0.50	30	1800	1.34	1.89	33.60	44.70	15.55	19.89	18.05	24.80	1.06	1.46	32493	44645
0.58	35	2100	1.23	1.74	32.33	43.11	16.20	20.49	16.14	22.62	1.11	1.55	33890	47504
0.67	40	2400	1.15	1.62	31.32	41.63	16.75	21.37	14.57	20.26	1.14	1.59	34978	48615
0.75	45	2700	1.07	1.51	30.51	40.43	17.16	21.71	13.35	18.72	1.18	1.65	36042	50536
0.83	50	3000	1.01	1.43	29.83	39.43	17.56	22.27	12.27	17.15	1.20	1.68	36819	51452
0.92	55	3300	0.96	1.36	29.25	38.58	17.84	22.54	11.41	16.04	1.23	1.73	37647	5293
1.00	60	3600	0.92	1.29	28.75	37.86	18.14	22.96	10.61	14.89	1.25	1.75	38187	53621
1.50	90	5400	0.73	1.04	26.03	34.00	18.33	23.15	7.70	10.85	1.36	1.91	41574	58569
2.00	120	7200	0.63	0.88	25.28	32.83	19.49	24.50	5.79	8.33	1.36	1.96	41656	59982
2.50	150	9000	0.55	0.78	24.45	31.76	19.52	24.87	4.93	6.89	1.45	2.03	44378	62034
3.00	180	10800	0.50	0.71	23.80	30.93	20.40	25.40	3.40	5.53	1.20	1.95	36705	59743

broken up into additional smaller storm detention ponds. Pond sizing does not include the existing ponds which are actually considered water hazards and will be full throughout the year.

The storm water management for the golf course provides for the analysis of the tributary areas for each of the ponds and links the storm detention ponds to work as an integrated system. Therefore, the sizing for Pond 2 is based upon the outflow from Pond 1 and the tributary area for Pond 2. This is typical for the sizing of Ponds 2,3, and 4. A summary of the sizing of the ponds is shown in Table 6 below.

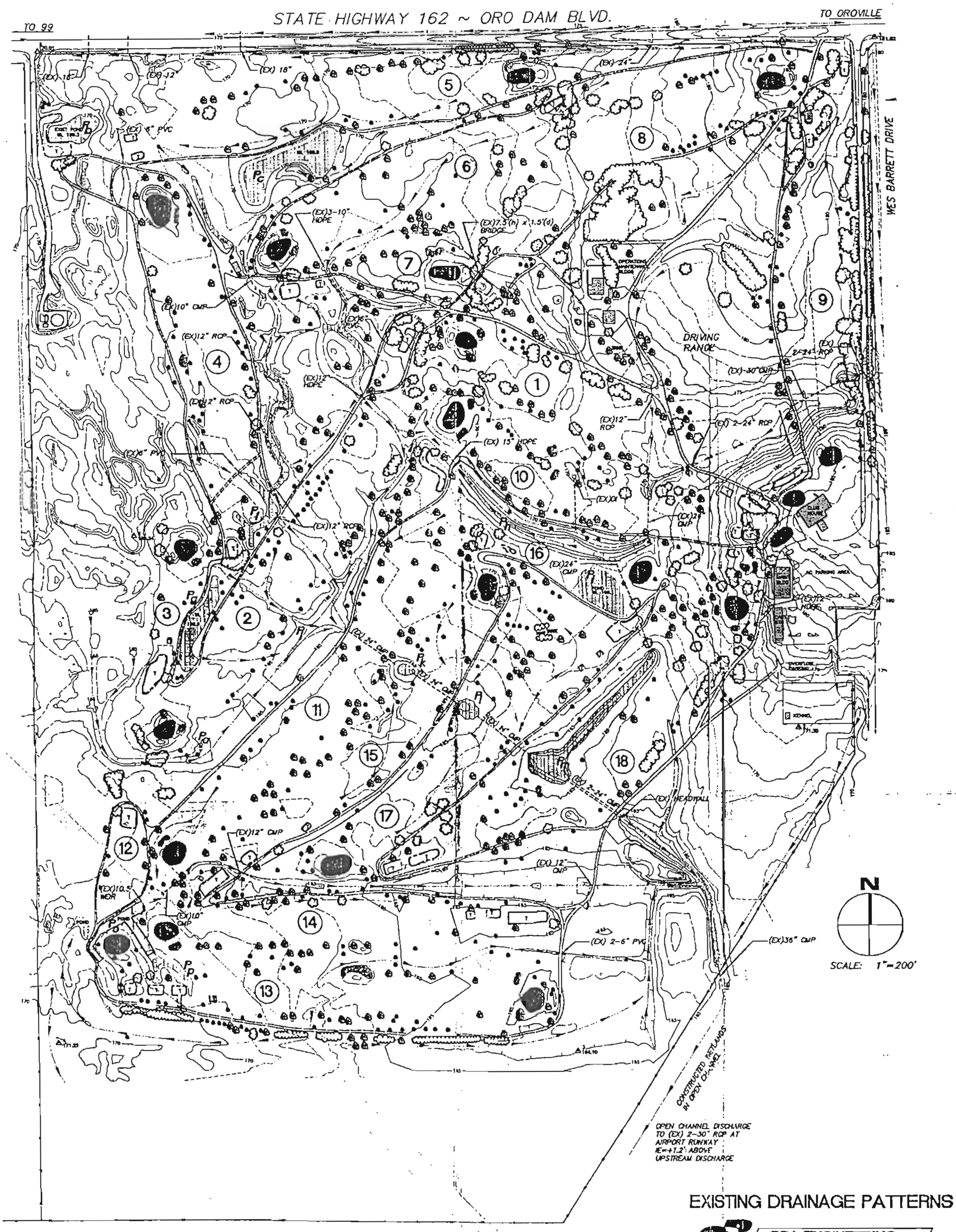
Table 6: Summary of Pond Sizes[3]

Description	Required Storage	Width	Depth	Length	$\text{Depth}_{\text{Total}}$
Pond 1	33,121 CF	212 Ft	1.0 Ft	212 Ft	2.5 Ft
Pond 2	100,512 CF	150 Ft	2.0 Ft	800 Ft.	3.5 Ft.
Pond 3	302,149 CF	150 Ft	4.0 Ft.	600 Ft	5.5 Ft.
Pond 4	62,034 CF	175 Ft.	4.0 Ft.	175 Ft.	5.5 Ft.

During the design phase, the controlling factor for pond sizing is the required volumn required plus any required freeboard. The width, length and depth provided should only be used as a guideline in determining potential area required.

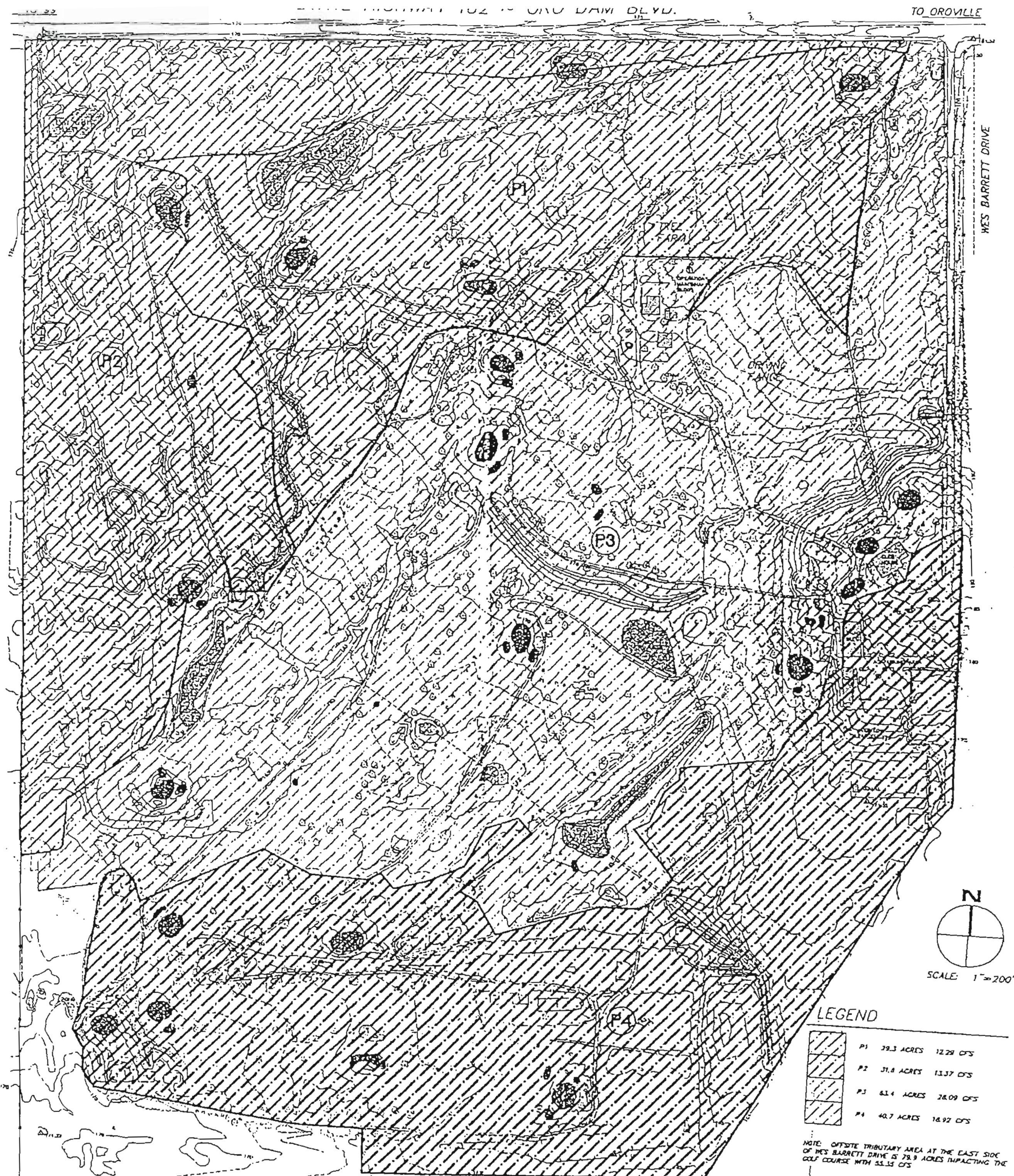
[3] The total depth shown in the last column of the table represents the calculated depth of the pond plus 1.5' of freeboard typically required in the final design of the ponds.

Ponds not considered a part of the storm detention system are Ponds P_b, P_c, P_j, P_k, P_l, P_m, and P_o. As shown on Figure 5, Proposed Drainage, the existing water hazards are intended to be enlarged, however, the sizes and shapes shown are only conceptual and do not represent the final design configuration. Ponds shown on Figure 5 considered as storm detention ponds include Ponds P_a, P_d, P_e, P_h, and, P_n .



EXISTING DRAINAGE PATTERNS

BBA ENGINEERING
CIVIL ENGINEERS • LAND SURVEYORS
2000 Park Ave. Oroville, CA 95966 (916) 534-1911 FAX (916) 534-0906



TRIBUTARY AREAS FOR POND SIZING

BBA ENGINEERING

GOLF COURSE

2700 ORO DAM BLVD., OROVILLE, CA 95965

PAGE 17

DRAINAGE ANALYSIS

FIGURE 4

Recommendations

The purpose of this analysis was to identify the drainage problems at Table Mountain Golf Course, find the cause of the problem, locate the areas impacted, and find a solution to reduce those impacts identified. More particularly, the need for providing viable solutions to eliminate course flooding.

As discussed in the section entitled, "Drainage Analysis", course flooding is the result of the items identified on page 7. To eliminate the impacts to the course it is important to solve those problems identified. The process should be accomplished as follows:

a) Survey the site

  i) Provide a survey with contour mapping to the ½ foot interval. This will provide the design phase accuracy for regrading and sizing of the ponds and more accurately delineate the direction of flows alongside all fairways.

  ii) Survey and provide spot elevations at each existing culvert to ensure adequate flows and/or maintain existing flow gradients as required in the design phase for regrading the site.

b) Provide subsurface drainage systems for draining fairways

  i) Connect subsurface drainage systems to underground infrastructure or provide discharge into an open channel system with positive flow to existing ponds or to the storm retention ponds shown on Figure 5.

c) Construct berms adjacent to State Highway 162, Oro Dam Boulevard, to ensure roadside drainage does not encroach onto Table Mountain Golf Course.

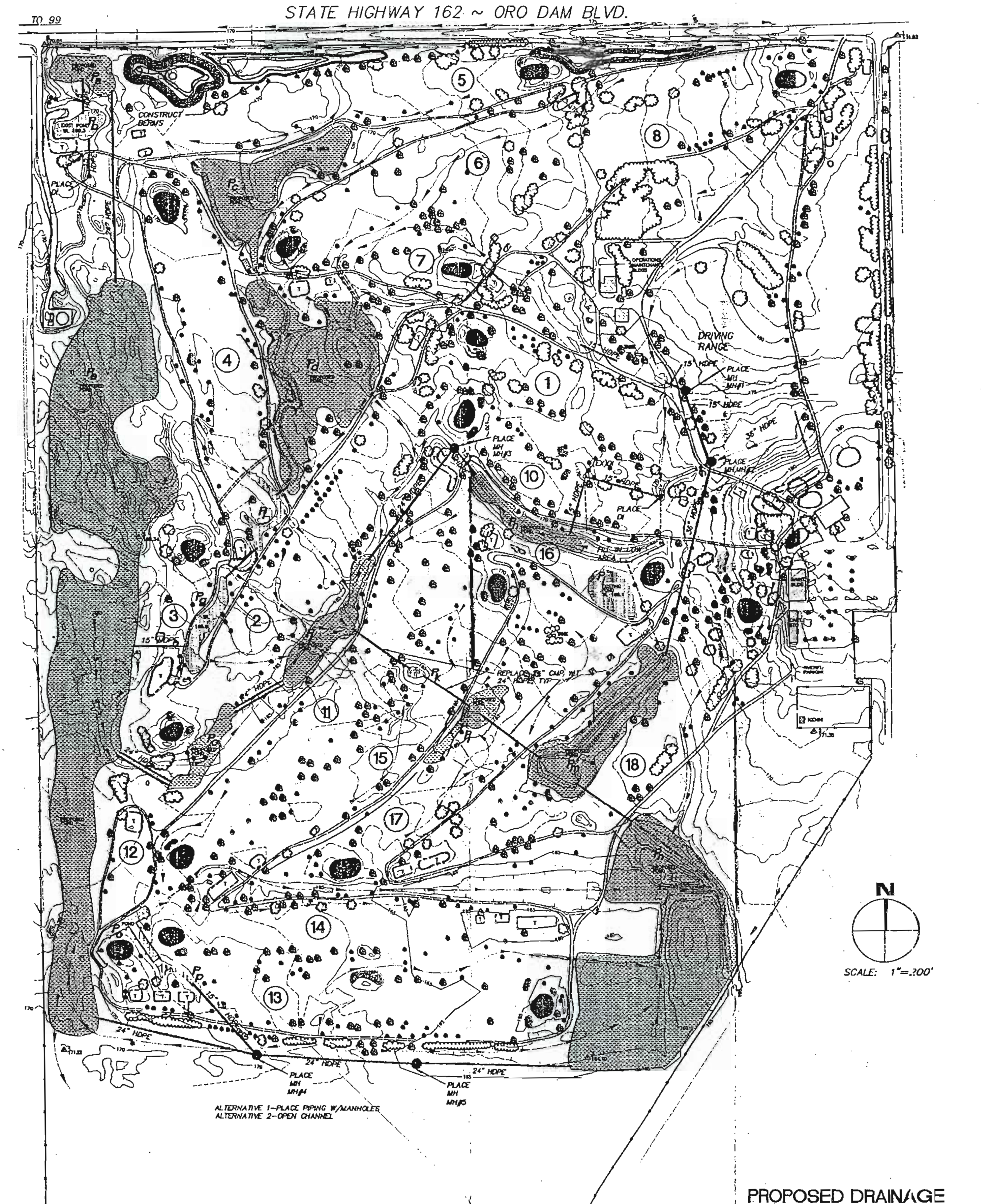
d) Redirect off site storm water from the Airport to Pond P_m. Remove existing culverts and re-size to provide positive flows to the existing pond.

e) Construct storm retention ponds P_a, P_d, P_e, P_h, and, P_n . These ponds are sized to provide storage such that the water discharged from the site will not be greater than the downstream culvert capacity of 21 cfs.

f) Remove and replace all culverts on the site. Use HDPE(High Density Polyethylene Pipe), or, RCP (Reinforced Concrete Pipe) to provide the best flow characteristics having slopes less than 0.5%. Figure 5 provides locations of proposed piping in red.

g) Provide double piping through pond system to provide the ability to recirculate retained water to reduce and or control stagnation.

These recommendations may be implemented simultaneously, or, this could be a phased process. Should phasing be considered, implementation of removing the off site storm water impacts from the golf course would be the first priority. Subsequently, the work would continue upstream until resolution of all of the recommendations had been implemented.



PROPOSED DRAINAGE

BBA ENGINEERING
CIVIL ENGINEERS • LAND SURVEYORS
2050 Park Ave. Oroville, CA 95965 (916) 534-1911 FAX (916) 534-0906